ROCKS and MINERALS

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The Official Journal of the Rocks and Minerals Association

Courtesy Ward's Natural Science Est.

QUARTZ ENCLOSING TOURMALINE
(Tourmalinated Quartz)
Jefferson County, Montana

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WHOLE No. 68

CAVERNS OF THE MOJAVE

By W. SCOTT LEWIS

Tourists entering California by way of the Union Pacific from Salt Lake City look with bored eyes upon a vast gray expanse rimmed with barren mountains, and wish it didn't take so long to reach the orange groves of the San Gabriel Valley. But it is probable that even the most hardened globe trotter would begin to take some interest in his surroundings if he knew a little about the wonders that are concealed beneath that grim surface. He might feel more like stopping for awhile if he realized that the sound of the car wheels was roaring through caverns so vast that it was plainly audible to explorers 20 miles away, and there is no question as to what he would want to do if he knew that thousands of feet below him a river flowed over sands of gold.

Literally millions of people know the desert as a land of heat in the summer and cold in the winter, where long whiskered prospectors climb over the cliffs in search of wealth which they rarely find. But very few know that beneath the desert that they have seen pictured there is a fairyland of beauty that staggers the imagination. These lower regions are, as yet, almost unexplored, in spite of the fact that some of the entrances are but an easy day's trip from Los Angeles.

The story of the explorations that have already been made reads like a chapter from Jules Verne. It really goes back to a day many years ago when three men walked into the Monagan & Murphy Bank at Needles, California, and deposited $57,000 in gold which they said they had obtained from an underground river flowing far below the surface of the desert. Returning to their strange placer one of the men fell into the stream and was swept to an unknown grave. This so aroused the superstitions of the others that they returned to the surface and refused to have anything more to do with the region.

Fifteen years later E. P. Dorr, an old prospector, learned the approximate location of the entrance to the cave and after a long search found it and began exploring the vast new world to which it gave access. In company with a mining engineer he traveled for three days downward through corridors adorned with stalactites hundreds of feet long, passing at times through chambers so vast that even the most powerful electric torch could not reach the ceiling. Finally they passed through the limestone and claim to have reached a great granite gorge. Making their way down into this with the greatest difficulty they at last reached the brink of a river that flowed in absolute silence through the eternal darkness —and the black sand on the river bank was rich with gold. At this point they were nearly 5,000 feet below the entrance and eight miles to the south of it.

Returning to the surface they dynamited two narrow passage ways in order to keep others from jumping their claim while a title to the property was being obtained; but, alas, the job was done too well and they

found it impossible to reopen the door to the black and mysterious river.

A few years ago a prospector came to the writer with tales of several caves in the Mojave Desert and requested that a map of the limstone formations be sketched showing the more likely places to look for other possible entrances to the underworld. This was done and his explorations have been followed with much interest. This man, whose name we have not yet obtained permission to divulge for reasons easily guessed, claims to have found his way down to the same river by a different route. He has told us almost incredible stories of rooms 1,000 feet high, of corridors along which sweep icy winds and of others where a hot blast is felt. He also tells of a granite gorge 5,000 feet down, although this strains our credulity and we have been inclined to laugh at some of his stories as the result of overtaxed nerves. But the thing at which we have not been able to laugh is a slab of rock said to have come from the bank of the river—a rock literally plated with gold. He says he has a mine that is tabulously rich, and he doesn't even know where it is! That is he doesn't know the point on the desert that is above it, and he cannot file a claim or protect his rights until that has been determined.

It always seemed to me that these cave stories should be taken with the proverbial grain of salt, as we all know how easy it is for old prospectors to exaggerate a bit, so that a good story rarely loses anything in the telling, but not so long ago I climbed a certain rugged mountain in the heart of the desert. It proved to be a mass of limestone of Carboniferous age or older, sharply faulted against a garnet schist. Making my way with two companions up the difficult slope we came to a high ridge across which the wind rushed with such velocity that it was hard to stand. We had been told to look down from this saddle to the tallest juniper tree and make our way to it, but unfortunately all the juniper trees seemed of the same size when viewed from above, with the result that we wandered around for hours with the temperature near the freezing point. Just as we had about made up our minds that we were looking for something no more tangible than a dream, we suddenly came upon a hole in the rocks and entering found ourselves in a rock passageway sloping steeply downward. Making our way with care, we studied the stalactites that had been broken off revealing their concentric structure, and collected a few of the smaller ones which we later found to have a pale phosphoresence after exposure to an argon light.

We did not reach an underground river as that would have meant carrying a large amount of rope and equipment, even supposing that a passage existed down to that mysterious stream, but we did reach a shaft extending to unknown depths. Crumpling newspapers into big balls we lit them and tossed them out, and as they floated like great balls of flame down into the earth, lighting up corridors and chambers unknown to man, we forgot all our doubts and came away believing the whole story, for the time at least. We even devised at least two good theories to explain the granite gorge.

We believe that it has been demonstrated beyond a shadow of doubt that a vast network of caverns extends through the ancient limestone formations of the Mojave Desert. It is to be hoped that explorations will be pushed with vigor and that the more spectacular caves will be opened to the public in the not distant future. One near Essex is already open and some work has been done on another near Shoshone. Ultimatelv we should know the exact truth, even about the underground river, the "granite" gorge and the golden sands.

IRIDESCENT PUMICE

A NEW FIND IN OREGON

By C. P. BECKER

In May, 1936, while prospecting in the beautiful Cascade Mountains, in Deschutes County, Oregon, by chance I ran across a deposit of an unusual mineral—iridescent pumice. The pumice occurred in a small bed of volcanic ash that was from 20 to 30 feet deep and from 500 to 600 yards in length. The occurrence of the pumice is similar to pocket gold. Sometimes several cubic yards of ash must be removed before a piece of pumice is found; at other times 10 to 12 specimens are found before a cubic yard of ash is removed.

The volcanic ash bed is from 70 to 100 feet wide, surrounded on all sides by lava, and is in the foothills of the Cascade Mountains. I found it accidently while working near it.

The pumice occurs in the form of small bombs, similar to volcanic bombs. They vary in size from two to eight inches in length and from one to four inches wide. Their exterior color is a dirty grayish brown so that the bombs are not at all attractive until they are broken open when their interiors present the most beautiful coloring imaginable, which causes the iridescence. It seems as if the rainbow had stained the pumice with all its splendor. The predominating colors are green, scarlet, blue and violet, and these and other tints blend to make many attractive shades as the light strikes them. Under a magnifying glass, one can get a greater conception of the beautiful colors. Not all bombs show this brilliant array of colors; the majority of specimens are barren of color.

Some of the pumice is all one color and not iridescent. Such specimens are rare, as only a very few have been found. Another rare find was two veins of iridescent pumice sand. One vein was about 18 inches wide, the other about three feet. The sands are of three colors, deep purple, golden, and light blue. These also are beautiful under a magnifying glass.

One strange thing about the pumice is that on submerging in water its coloring is lost but on drying out the colors return. To my mind, this is the only mineral to act this way. Generally, water brings out the coloring in minerals.

Here is one for Robert Ripley. I have eight or ten pieces of what I have named "Chamelian Pumice" because they will change color, simply by blowing on them.

Some of the pumice, if not too heavily mineralized, will float on water. To look at the specimens one would imagine a piece the size of one's fist to weigh about five pounds whereas five ounces is nearer the corect weight.

At one spot, a large prominent point, pumice occurs showing all the colors blended together as in a rainbow. When the sun shines on this mass it is a very imposing sight. The point, however, is crumbling from exposure and from general appearance one would come to the conclusion the staining is due to gases rising from below.

As I was interested in these odd specimens, I have sent some out to several collectors and museums for examination. Dr. W. F. Foshag of the U. S. National Museum stated: "The two specimens from Oregon are pumice with a natural iridescent stain. This stain is probably an oxide of iron similar to the iridescent stains that are sometimes found on limonites. The amount of staining material is too tenuous to be determined by chemical means. I do not believe the pumice is the usual rhyolitic pumice. It is either andesitic or hasaltic pumice. They are rather unusual and I have never seen any pumice showing this brilliant iridescence before."

THE INTERNAL STRUCTURE OF THE EARTH

A model showing the internal structure of the earth is on exhibition at Field Museum of Natural History. It is a representation of the southern hemisphere, with parts cut away to show the interior, and was made in the laboratories of the museum's department of geology.

Instead of a thin crust over a molten interior, as the earth was once conceived to be constructed, the model shows three concentric shells of rock of increasing density wrapped around a core of hot metal. The features illustrated obviously have never been directly observed, it is pointed out by Henry W. Nichols, curator of geology, under whose supervision the model was made, since the diameter of the earth is 8,000 miles, and the deepest excavations for mines have penetrated the outer crust for less than two miles. Yet, in spite of the impossibility of direct observation, the major structural features as shown in the model have been determined indirectly by study and measurement of geological and physical phenomena which can be observed on the surface, Mr. Nichols explains. These studies have been varied and complex, and have required thousands of delicate measurements, much mathematical computation, and years of work by able geologists and physicists. The most important line of attack on this problem has been a study of the effect on earthquake waves of passage through the earth. Interpretations of the meaning of variations in the strength of gravity and changes in elevation of land surfaces have also been important, Mr. Nichols says. The study of meteorites has had a share, as have also determinations of the strength, melting points, elasticity and other features of rock.

The outer shell of the earth, the model shows, is incomplete—it underlies the land but is absent under the deeper parts of the sea. Its boundaries have not been mapped, but it is believed to cover about half of the surface. It is composed of granite and related rocks, and is called the sial. It is thirty-seven miles thick over much of its extent, but the thickness is not uniform. It floats upon a heavier shell, called the sima, composed of basaltic rock. The sima, 700 miles thick, rests upon a third shell, the transition layer, concerning which little has been learned. It is known that it is 1,060 miles thick, and in divided by two discontinuities into three concentric shells which also are shown in the museum model. It may be composed of ultrabasic rocks heavier than basalt, says Mr. Nichols, or it may be a mixture of compounds of heavy metals with such elements as sulphur and phosphorus. This transition layer rests upon a metallic core 4,000 miles in diameter, which is an alloy of iron and nickel with unknown quantities of other heavy metals.

In the model these rocks and metals are represented as they would appear, cooled, at the surface of the earth. Their true appearance must be quite different, owing to the tremendous heat and pressure to which they are subject, Mr. Nichols states. The weight of the overlying rock is millions of pounds per square inch on the top of the sima, and more at greater depths. The temperature is so high that the rocks are kept from melting only by the enormous pressure to which they are subjected. The pressures and temperatures are so much greater than those encountered in ordinary human experience that little can be positively known of the physical state of the rocks or what they would look like if they could be seen. There is evidence both that it may be extremely rigid and that it may be plastic. The plasticity and rigidity may resemble that of stiff pitch which is elastic and unyielding to momentarily applied forces, yet yields so readily to continued force that a lump of it will flatten and flow of its own weight.

HUNTING ROCK CRYSTALS NEAR HAUTO, PENN.

By PETER ZODAC, Editor
Rocks and Minerals

Near a small community called Hauto, in Carbon County, Pennsylvania, there is a locality for quartz crystals that is worth visiting. The locality covers quite an area of wilderness but one good spot is about 300 feet west of the Bear Creek Dam. The dam is on Broad Mountain and is the main water supply for Lansford, a populous coal mining town in Panther Creek Valley, about three miles to the south.

During 1917 when the writer was a junior mining engineer on the engineering staff of the Lehigh Coal and Navigation Co. (now Lehigh Navigation Coal Co.) whose headquarters were in Lansford, he made frequent trips to Bear Creek Dam. He would get off at the Hauto railroad station, walk across the tracks directly in front of the station and then follow a pipe line and brook (Bear Creek) which led him up to the dam about two miles to the north. To the west of the dam and stretching northward, for miles, was a fire barrier. The fire barrier was a lane or clearing, perhaps 100 feet wide, cut through the woods and whose purpose was to cut off forest fires should they occur.

It was in the clearing of the fire barrier that the writer found his choicest crystals, some of which were three inches in length. The crystals were found lying loosely on top of the ground or mixed lightly with the soil, and they were plentiful. All he had to do was to look around him and when he saw something glistening walk up to it and it would be a crystal.

It was soon apparent that the best time to collect crystals was on a sunny day right after a heavy rainstorm. The rains would not only wash crystals out of the ground but those that had been exposed and which may have become coated with dust or dirt would be washed clean. Then by walking toward the sun, the rays of light would be reflected by the crystals, as by a miorror, and thus they were easily spotted. Within a half hour's time, at least 100 good crystals could be found. No attempt was made to dig for them; there were enough good ones on the surface. The crystals were all loose and with but one termination.

The main rock of Broad Mountain is Pocono sandstone which is coarse and grayish. There is no doubt but that the crystals had weathered out of the sandstone of the mountain although no ledges showing the crystals actually in place were to be seen. None of the crystals collected by the writer showed any signs of being water-worn which indicated conclusively that they must be of local origin.

Though the writer collected crystals at the locality 19 years ago, investigations prove that they are still available.

Courtesy Ward's Natural Science Est.

QUARTZ, VAR. CHALCEDONY

Emery County, Utah

TOPAZ ON BALDFACE MOUNTAIN, N. H.

By MILLARD H. CHANDLER

Royce House, North Chatham, N. H.

For many years, topaz crystals, both colorless and amber-tinted, have been found on Baldface Mountain, near North Chatham, N. H. Edgar Andrews, now deceased, is believed to have been the discoverer of the mineral. Dana records topaz as occurring here as well as phenacite and his reference no doubt was taken from Kunz's "Gems and Precious Stones of North America." Regarding phenacite, Dana says: "In New Hampshire, in lenticular crystals with topaz on Baldface Mt., North Chatham, a few miles west of Stoneham, Me. (Kunz)."[1]

North Chatham, a little summer resort, is in the extreme northeastern part of Carroll County and only about one-half mile west of the Maine border; the county is in the eastern part of the State.

Baldface Mountain is approximately two and one-half miles southwest of North Chatham. The mountain consists of two small peaks, North Baldface, 9,605 feet high (in Coos County) and South Baldface, 8,585 feet high (in Carroll County—the county line passes approximately midway between them); it is on South Baldface that topaz and phenacite are found. The mountain received its name, Baldface, from its bare ledges which are especially conspicuous now as some 35 years ago a huge forest fire destroyed all trees and vegetation.

The prevailing rock of the mountain is Conway granite, a light-colored FOUR—ROCKS AND MINERALS — medium-grained rock, easily worked, as it will rift almost perfectly in any direction. It is in this granite that topaz occurs. No special clues for finding topaz can be given; one simply has to examine the outcrop in search for the mineral. Outcrops are numerous and so also are the chances for finding topaz.

The topaz is generally found in pockets in the solid Conway granite. The pockets are often lined with feldspar, smoky and clear quartz and most of them contain quite an amount of kaolin. The writer never saw but two topaz crystals in matrix; nearly all of them are found detached from the walls of pockets and occur in the kaolin in the bottom of the pockets. The loose quartz crystals are almost without exception found lying on top of the topaz crystals in the pockets. Topaz and phenacite occur together in the same pocket. The phenacite crystals are small, the largest in the writer's collection being about ½ x ¾ inch and is not clear enough to cut though several others might cut small stones. Aquamarines of small size but very clear also occur but they are found separately and on the west side of the mountain.

There are no mines or quarries on the mountain but two pits had been extensively worked for topaz years ago. On top of the first ridge and perhaps 60 rods to the right, down over the north side of the mountain, is one of the pits in a large pocket the dimensions of which are roughly four feet in diameter at the top, eight or nine feet deep, and about six feet in diameter at the bottom. At the bottom, the pocket leads off horizontally in two directions for about two feet to the east and about 18 inches to the south. Many fine topaz crystals have come out of this pocket. The writer believes the pocket is by no means exhausted; that many good crystals of topaz are still present in the vein but as the vein dips sharply to the east, it is not practical to work it. Furthermore, the area is now in the White Mountains National Forest and blasting is forbidden. Added to this, so many people climb the mountain the year round, and especially in the summertime — often stopping to pick berries or to examine flowers or plants, and thus temporarily escape detection—that it would be extremely

1 Dana—System of Mineralogy, 6th Ed., p. 463.

dangerous to blast even if no bans were in force.

The second pit is just a few rods above the first one. It is much smaller in size and was apparently worked out.

Many pockets are scattered over the mountain, most of which are small in size. To the writer's knowledge, at least 15 are known which have produced topaz and without doubt many more could be found.

The Conway granite occurs in layers from one to ten feet thick. It often breaks off in large sheets, due to frost action, and sliding to the foot of the mountain, forms a talus. The writer has seen a pocket about two inches in diameter running perpendicularly through several of these detached slabs that were from two to four feet thick. These pockets undoubtedly contained topaz crystals, so it is safe to say the mountain is strewn with topaz. There have been instances when topaz crystals have been found loose lying on top of ledges or in cracks where no pockets occurred. The writer himself has found several nice gemmy crystals in this way and later by diligent search found the very pocket from which they came out of far up the mountain side.

The writer has at least seven topaz crystals that are more than an inch in diameter and three-quarters inch long, others range from this size down to very minute ones. Many of the topaz crystals found here have been cut and made very brilliant gems, especially those that were amber tinted. The writer has several cut stones of one carat weight each.

It has been reported that some fine topaz crystals were found on North Baldface; the writer never found any though he did find black tourmaline crystals.

Last fall while hunting, the writer discovered some well preserved glacial striae on the lower slopes of North Baldface. It was suggested in "The Geology of New Hampshire" by James Walter Goldthwait, that the large basin with precipitous sides between South Baldface and North Baldface might be a glacial cirque. The writer feels that his discovery of the glacial striae running across a very steep ledge would strengthen if not prove Goldthwait's theory.

The distances and directions in this brief article are all taken from the Appalachian Mountain Club trail which starts at the Royce House in North Chatham. There is an open front shelter at the base of the mountain, built and maintained by the U. S. Forest Service. It is wholly inadequate, however, to accommodate campers at times, especially during the berry season. South Baldface Mountain is very rough and quite steep. If any one wants to prospect for topaz he should wear strong durable shoes and clothing, and should always carry a coat or sweater—no matter how warm the day—the weather plays queer pranks on one often very suddenly.

The writer feels that Baldface is a good locality for topaz crystals and that the amateur has nearly as good a chance of finding them as has an expert because the element of chance enters into the hunt so often. He does not wish to give the impression, however, that topaz may easily be found every time one climbs the mountain. But he knows that crystals are still there and that they can be found by any one who has the patience and diligence to hunt for them.

In various sections of the country, where rock crystal is especially plentiful, hills, mountains and other areas have been named after the mineral. Thus we have Crystal Mountain, Arkansas; Diamond Island near Portland, Maine; Diamond Hill in Greene and Herkimer Counties, Diamond Island in Lake George Warren County and Diamond Point on the island, all in New York; Crystal Hill, Pennsylvania; and Cape Diamond, near Quebec, Canada.

These are but a few instances; no doubt our readers can name others. Rocks and Minerals would appreciate it if readers would submit lists of names known to them that are not mentioned above.

DINOSAUR TRACKS IN CONNECTICUT

FOOT PRINTS IN THE SANDS OF TIME

By KARL PROCTOR PERRY

Hartford, Conn.

Along both the ancient and recent shores of the Connecticut River Valley of New England are occurrences of red sandstone which not only have been extensively quarried for building and other purposes but also contain numerous fossils that are of great interest to paleontologists. Dinosaur footprints are the most interesting and very fine specimens have been obtained by collectors. Sandstones containing footprints extend from Turners Falls, Mass., yes even as far north as Newbury, Vt., southward toward Long Island Sound.

A few years ago, my wife and I went out for a short auto ride down the Connecticut River road to Wethersfield, Conn. (four miles south of Hartford). In examining the Wethersfield Cove shore line, we discovered some fossil footprints in sandstone which we thought at the time to be bird tracks. We later learned our mistake as they proved to be those of dinosaurs. This got us intensely interested in the footprints and we made several trips to the locality, each time bringing home more tracks for study and comparison. We were so highly pleased with our progress along this line that we visited later Laurel Brook, south of Middletown, Conn. (fourteen miles south of Hartford), where we found fossil fish in sandstone. There were plenty of broken pieces scattered around at this locality but we found only one perfect specimen which measured about seven inches in length.

Our next venture was to Powder Hill and Besek Lake near Durham, Conn. (six miles south of Middletown). Here we found a great variety of tracks, some not less than nine inches in length and many smaller ones but were not allowed to collect any because the sandstone quarries in which they occurred were owned by Yale University of New Haven, Conn., and collecting was prohibited.

There has never been any great catastrophe in which some good does not come out of it. During the big flood of March, 1936, the high waters pushed their way down the Farmington River (nine miles west of Hartford) and exposed rocks that heretofor had been covered with soil. In these newly exposed rocks, which had been washed clean, many dinosaur tracks were found and collected. So plentiful were they and so much interest was shown in them that a writer in our local paper, **The Daily Times** of Hartford, made this jest saying that two dinosaurs had a slight argument as to which way to travel. Said one dinosaur, "Let's cut across here." To which the other replied, "Not me, I don't want to get all muddy."

Now after about 200 million years have passed, these wonders of the ancient world have come to light—foot tracks of an extinct reptile, the dinosaur (meaning terrible lizard), the largest creature known to have walked on this earth. They walked on their hind legs, like a biped, but they also had two forefeet that were smaller. Their hindfeet were three-toed like those of birds; their forefeet were four-toed and were sometimes put down when walking or resting. There were two distinct types of dinosaurs —flesh eating and plant eating. **Tyrannosaurus,** a reptile of great strength and activity, was a flesh eater, a giant of 40 feet in length. His chief antagonist was **Triceratops,** a three-horned vegetarian or plant eater, slow moving and partially armored about the head. **Brontosaurus,** which lived mostly in the water, varied in length from 65 to 70 feet and weighed about 10 tons. A midget to the **Brontosaurus** was the **Protoceratops,** the only dinosaur that was positively known to lay eggs, like the mud turtle of today. Nests of its eggs, petrified of course, have been found. This reptile was esti-

mated to have been only five or six feet long, with a small protected head having a beak like that of a parrot. They were duck-billed, with a big head that contained only about an ounce of brains.

Messrs. John Sipple and Arnold Wheaton of Windsor, Conn., share honors in finding many tracks in Rainbow, a small hamlet in the town of Windsor; these tracks do not vary much in size and are similar to those found at Wethersfield Cove. The tracks found at Powder Hill are larger and represent reptiles of greater proportion in size.

It took President Edward Hitchcock 30 years to describe and name the various dinosaurs of the Connecticut River Valley, so what can be expected of an amateur.

To Dr. Barnum Brown, C. R. Knight and many others, we amateur collectors are deeply indebted for many discoveries in this fascinating field.

SOME NOTES ON IGNEOUS ROCKS

Because granites, and all other igneous (or heat-formed) rocks other than volcanic lavas, are never formed at the surface of the earth, and can not be seen under the conditions in which they are formed, the department of geology at Field Museum of Natural History has constructed and placed on exhibition a model which illustrates the various shapes assumed by such bodies of rock in their original subterranean positions. Normally to be seen only where thousands of feet of other rocks above them have been eroded away in the course of centuries, the model makes it possible for museum visitors to gain an idea of how these rocks occur before they are exposed by erosion.

The crust of the earth, composed of the various rocks with which we are familiar, is underlaid at the great depth of possibly thirty-five or forty miles by rock so hot that it would be liquid were it not compressed into a state that more resembles a solid by the enormous weight of the rock above, according to Henry W. Nichols, curator of geology, under whose direction the exhibit was prepared. This hot rock is called magma, and from it come all lavas, all granites, and all other igneous rocks.

"Magma is more or lesss plastic, and in places it endures not only the weight of the miles of rock above, but other pressure exerted by mountain-building forces," writes Mr. Nichols in a recent issue of Field Museum News, monthly bulletin published for the museum's several thousand members. "In places where the pressures are unusually great, or where the strata above have been weakened, portions of magma may be squeezed upwards into the overlying rock, becoming liquid by relief from pressure as it moves upward. The liquid magma may penetrate completely through the crust and cause a volcanic eruption. Usually the injections do not reach the surface but remain entrapped in the rocks below as bodies of liquid magma. As the magma mass is surrounded by an insulating body of rock thousands of feet thick, it cools very slowly, and thousands of years may pass before the molten magma has frozen to solid rock. The slow cooling under pressure produces a rock in appearance and properties quite unlike the more rapidly cooled lava from a magma of the same composition. This rock is dense, strong and completely crystallized, whereas the lava is more or less porous, less well crystallized, and finer grained.

"It might be supposed that these masses of igneous rock formed by injection into rocks of various kinds and structures would present usch a variety of irregular shapes that any attempt to classify them by shape would be hopeless. But it has been found that nearly all forms, however they may differ in minor detail, can be grouped into a few easily recognized classes, the principal ones of which have been designated as 'batholiths,' 'stocks,' 'bosses,' 'laccoliths,' 'dikes,' 'sills,' and 'apophyses.'"

The model shows examples of each of these forms. It has been made simple in design, and is accompanied by an explanatory text, so that it may be easily and quickly understood by the visitor without technical knowledge.

CARRY YOUR OWN CANTEEN

A DESERT TREK THAT ALMOST PROVED FATAL

By J. W. PATTON

Six years ago, with three specimen hunters, I started on a trip to the driest part of the Mojave Desert, Calif., to spend a week looking for rocks and gem materials. It was about the first of September and the weather was very warm, even along the coast.

We left Los Angeles late in the afternoon over the Valley Boulevard. We travelled in two automobiles well loaded with camp equipment and cans and kegs of water, as we expected to be many miles from water for several days.

We drove north through the cities of Pomona and San Bernardino, and through the Cajon Pass to the summit of the San Bernardino Mountains. This route took us through the heart of the orange-growing district of Southern California, as well as through one of the largest vineyards in the world. This is one of the most beautiful drives in California, and the road is paved all the way across the state.

At the summit we had our first glimpse of the desert. From here to Victorville, about sixteen miles, the road is almost straight and slightly down hill.

Along both sides of the road and as far as the eye could reach, the desert was covered with Joshua trees. These are the queerest "trees" I have ever seen. The trunks are pithy instead of solid wood. The bark is rough and shaggy. What might be called the leaves are long slender blades with sharp points. There are from two to a dozen branches, and some of them are as thick as the trunk, which is sometimes a foot thick, and I have seen some that were eighteen inches thick. In the spring there is a large waxy white flower on the end of each branch. These flowers greatly resemble a large head of cabbage when they are coming out. This was probably the largest grove of Joshua trees known. Some of the larger trees were thirty feet in height

Interspersed with the Joshua trees were many yucca trees. These are also pithy, but they have only the trunk without branches. At the top a great cluster of white, bell-like flowers appears. I have seen these flower clusters three feet long and eighteen inches in diameter. The yucca usually blooms only once and then the trunk dries up and breaks off. This trunk is often sawed up in short pieces and sold for pincushions.

We made camp under a large Joshua tree well back from the road, about midnight. That is, we set up our cots, removed our shoes, and went to bed under the stars.

On the desert there are myriads of stars visible, apparently far more than at sea-level. Some parts of the desert are three thousand feet above sea-level and other parts are below sea-level. There are very seldom any clouds and no fog. The air is clear, clean, and invigorating.

On this kind of a trip we do not carry tents except during the rainy season. It is a weird experience to lie on the desert and look at the stars through the Joshua trees, which appear white and ghostly by moonlight or starlight.

We had hardly drowsed off when we heard a voice saying, "Hello! Hello, there!" After a few minutes, just as I had gotten to sleep, the same voice came again, "Hello, there!"

This brought us all to our feet and we started looking around through the bushes. This produced no results so we returned to our cots after deciding that if the ghost wanted to keep us company, it would have to come into camp. This time I dropped off to sleep and heard nothing further, but one of the other fellows said he heard the same thing several times during the night.

It is absolutely still on the desert at night and when an automobile is coming you hear it for several minutes before it arrives. Any sound carries a long distance.

When I got up I decided to find out who the ghost was. I started out in a circle about an eighth of a mile from camp, and soon came upon a family camped in the open as we were. There two two little girls about nine and ten years old, playing in the sand. As I came up, one of them looked up and said, "Hello, there!" It was the voice of the ghost. After talking to the girls for a few minutes, I approached their father and asked, "Does that little girl talk in her sleep?"

He laughed and replied, "I'll say she does, and all day, too. She yells 'hello' to every one we pass on the road."

Well, that was a very sociable ghost, and I suppose other ghosts can be just as easily explained.

After breakfast we returned to the road and continued through Victorville and Barstow to Daggett. We had covered about one hundred and fifty miles when we reached the junction of two roads. One, called the Santa Fe Trail, led east from Daggett to Needles, and points east. The other one, called the Arrowhead Trail, led northeast to Las Vegas, Nevada, and Salt Lake City, Utah, and thence east. This was the road to Boulder Dam and was used by the Mormons in traveling between Salt Lake City and San Bernardino, after they established branches in Southern California.

We took the Arrowhead Trail and drove about forty miles to Mannix, which is simply a gas service station, some cabins, and a lunch room. Here we filled our water cans and gas tank and continued east about five miles, at which point we turned south on a road which was simply two ruts through the sand, but this was a good road compared to some we found a few days later.

After three miles of this road we came to the Mojave River. This river is one of the curiosities of the desert It has no banks to speak of. It meanders over the desert for miles, then suddenly disappears in the sand, only to appear farther on, probably as a bog or marsh. It is from ten feet to a hundred feet wide, and seldom over three feet deep, but it is dangerous to ford on account of quicksand But there is always a line of green trees, mostly willow, along side of the river, or where the river should be.

We reached the river at one of the bogs, and by careful driving and fording, we arrived at Afton Station on the railroad Here we found a freight station, a telegraph office, and a string of box-cars occupied by a gang of section hands.

We made camp a short distance from the station, and spent a hot night fighting mosquitos and other insects, and trying to sleep at the same time. Next morning we started south into Afton Canyon, glad to get away from the insects and the music of the frogs in the river.

From here on we knew there would be no roads, just the marks of tires where some other car had passed. Also there were no signs.

We were in the Cady Mountains between the Arrowhead and the Santa Fe Trails, which, at this point, were about twenty-five miles apart. We found no springs or water holes anywhere in those mountains. They were real desert. No trees, not even large bushes, after we left the river. Several of the famous lost gold mines are reputed to be in these mountains.

About a mile up the canyon we examined a deposit of jasper, but decided to get specimens there on our way out. In a steep walled side canyon, a mile further on, we inspected a deposit of hard blue rock which seemed to have some of the characteristics of the blue ground of the South African Diamond Fields. The one great difference was that we found no diamonds.

These mountains are all volcanic, mostly Felsite. Further south, along the Needles road, there is plenty of black lava and a number of extinct volcanoes with large craters. I have visited some of these, but will cover that in another article.

Continuing south in the Canyon we soon came to an old Fluor Spar mine and secured good specimens of green, yellow, brown, and white fluor spar. Looking around from here we could see crystals of calcite glistening on the hillsides. Upon examination, they proved to be perfect crystals with the typical calcite

angles. Most of them were white but I obtained some very good golden brown and yellow ones. Also many of them were perfectly transparent in crystals one-half inch square, being Iceland spar

I also secured some good dog-tooth crystals from one inch to five inches long. There were many other forms of calcite present, including some which were hexagonal and looked like quartz crystals. These may have been pseudomorphs. I found one cluster of transparent calcite crystals in a cavity, which was very beautiful.

While hunting around here we sighted ten wild mountain goats on a cliff high up on a mountain side. They were as large as small deer, and had long twisted horns. One of the fellows fired a shot to see them climb the mountain. The way they scaled that steep cliff and disappeared was most astonishing.

In our trips during the next few days we came upon their trails several times, and once saw a much larger flock of them, but they were very shy and seen only at a distance A few days later I saw a large mountain lion creeping along one of the goat trails, but the desert men tell me that Mr. Lion very seldom ever catches up with them. On one of these goat trails I saw a large rattlesnake which had been literally cut to pieces by sharp goat hoofs.

Since leaving the river we had seen nothing but sand, rocky hillsides, and rugged mountains. The only vegetation was greasewood and a few other low bushes. We saw lizzards everywhere, some of them a foot long, but they were harmless and loved to investigate everything in camp. They are not as bad as the trade rats which steal everything that is loose. There is also a species of fly which looks like a horse-fly but is three-quarters of an inch long, and which bites right through your shirt, and, believe me, you do not wear anything under the shirt out there in warm weather. When you drive one of these flies away he comes right back for more.

The temperature was a hundred and fifteen degrees during the day, and probably ten degrees cooler at night, so blankets were not much in demand.

After spending several hours getting fluor spar and calcite specimens, we continued up the canyon, which soon opened out on to great sandy washes between the mountains.

We came upon an old camp-site at the foot of a slope. Here some one had left an old cook-stove of the wood burning variety. We decided to make this place our headquarters, so we unloaded the cars and prepared supper. This place was about ten miles from the river.

It was here that I learned canned tomatoes is one thing that everyone who visits the desert should carry. They are both food and drink, and are best eaten directly from the can. A peculiarity about them is that so long as the can is sealed up they are cooler than the drinking water in cans.

As I have stated, there were four in our party. Two of them had hunting equipment and were far more interested in looking for game than for specimens. They had killed some rabbits and ducks along the river and we had a meal of them, but I much prefer bacon, eggs, potatoes and canned goods on the desert.

We had three five-gallon cans and one five-gallon keg full of water when we left the river, but by the second day the water had reached the same temperature as the air.

The next morning one of the hunters, whom we called Tom, claimed he was sick, so his friend Charlie stayed at camp with him, while my partner and I started out in our car to look for specimens. This partner was a man about fifty-five or sixty years old, who claimed to be a graduate of the Colorado School of Mines. His name was John H. Massen, and I believe he now lives in San Bernardino County. At any rate he was a good desert man and had spent many years mining and prospecting in that region. He taught me many things about the desert that have been very useful to me He goes by the name of Doc and is known all over that part of the state.

Well, Doc and I started east in our car and were soon busy picking up geodes, agates, carnelians, speci-

mens of iron and copper ores, and a great many others. Among others, I picked up some rough black and brown nodules which intrigued me. Doc did not think much of them but I took along about a dozen, weighing from one to five pounds each. I did nothing with them till last year. In sorting a box of rocks, I came upon them and put one on the saw and cut it in two. I was agreeably surprised to find that it was pure white opal surrounded by black iron and manganese, with patches of bright red chalcedony. These turned out to be California iron agates, which are rather rare in this section. They are the most beautiful agates I have found. That day I found some large specimens of manganese with botryoidal surfaces

We visited an old copper mine and secured some chrysocolla, moss agates and ribband agates from a small dike. This was about one inch thick and made beautiful red and white gems.

We returned to camp about five o'clock to discover that the hunters had departed, taking most of the water. We had about two gallons left including what was in our canteens. Without stopping to cook supper we started for the river, ten miles away. We had not gone far until we discovered that the radiator was dry and so had to use all of our water to fill it.

We reached the railroad soon after dark and filled our water cans and radiator from a tank car on the siding, which had been brought in for the use of the section hands who lived on the train. We went to the cook-car and secured a small piece of ice which we broke up and put in a one-gallon thermos jug. This insured us cool water for one night, anyway.

While we were at the train we were told that our friends were camped down on the river and had been shooting jack-rabbits, which were very plentiful there. What they wanted with them I do not know; I never was hungry enough to eat one. We saw no more of them, nor did we miss them.

Next morning we started for a canyon about five miles west from our camp, in which, at one time, Doc had found some green stones, which were said to be Californite. The trail to this canyon led up a dry water course between two high ranges. The trail was very rocky and hard to travel over. Several times it was necessary to get out and push, to shovel hard, or remove large rocks. This was not pleasant with the temperature above a hundred. It was so hot that it was impossible to lay the bare hands on the metal parts of the car.

We finally reached the mouth of the canyon and drove into it a short distance but were soon stopped by large boulders. This was a blind canyon about a mile and half long, with steep walls of igneous rock. It was about a hundred feet wide at the mouth but rapidly narrowing. The walls were about two hundred feet high. The floor and walls showed plainly that during storms, a vast amount of water comes down there. Doc said that a sudden storm, which is common in these mountains, often fills it, and the water marks on the walls show that it has been up ten feet. I thought what a nice place it would be to get caught in a storm.

We took a one-gallon canteen of water, a miner's pick, and a burlap bag, in addition to prospector's picks and specimen sacks. We hiked up the canyon about a mile and a half, to where the walls were not over ten feet apart. The temperature here seemed to be higher than on the open desert, probably a hundred and twenty. There was not the slightest semblance of a breeze. In fact it was the stilest place I ever was in. When a lizard crawled over the sand it startled me, and a vulture flying down the canyon sounded like an airplane.

The material we were after was on a level mesa at the top of the wall on the north side, and had to be reached by climbing a long slide which stood at an angle of sixty degrees. Doc had been complaining all morning that he did not feel well and could not perspire Now, when you cannot sweat on the desert you may be sure there is something wrong. I suggested that he should

lie down in the shadow of an overhanging rock and wait there for me. I decided to go on up to the top and try to get the specimens we had come so far to get.

I shouldered the pick and the burlap bag, but decided to leave the canteen with Doc, as I did not expect to be gone more than two hours. This was a mistake and served as a lesson to me.

Doc laid down and was asleep when I left.

I started up that slide, going ahead two feet and sliding back one foot, and was beginning to feel the need of water when I reached the top. But there was a little breeze up there, so I started looking for the dike of Californite. After about an hour I found it and started digging. Now digging in solid rock is hard enough anywhere, but up there with the sun beating down, it was hell. I stuck at it until I had about fifty pounds of rock.

When I looked at my watch I found I had been without water almost three hours. I immediately started for the top of the slide about half a mile away. By the time I reached the slide I would have given all the specimens I had for a drink of water, even though it was warm water. In desperation, I tied the sack and threw it down the slide and sent the pick after it. It was lucky I had to come down a slide instead of climbing a cliff, as my head was going around in circles. I didn't care if I never saw either the pick or the specimens again.

To make it worse, I glanced out over the desert to the east and there was a beautiful mirage, showing a lake of blue water, and at one side of it a cluster of green trees. I was not so far gone as to be taken in by a mirage, as I had seen many of them. I sat down and started down the slide holding on when I could, but mostly I traveled on my back, sometimes feet first, and sometimes otherwise.

I never could remember reaching the floor of the canyon, but suddenly came to my senses when I discovered that Doc and the canteen were not where I had left them. I spent a few minutes looking around, as I thought maybe he had just changed to another spot, but there was no sign of him, and I decided that if I was to come out of there alive, I had better start for the car.

I have heard of men on the desert without water becoming panic stricken, and starting to run, so I made up my mind to take it easy and not over exert myself. I left everything there and started out. The first half mile I managed to remain upright, but after that it was a case of up-and-down. I had been now nearly four hours without water, but if I had not done the hard work at the top of the hill I should have been all right.

Several times I tried to call out, hoping that Doc might hear me. I knew there was no one else within ten miles, but I could not make much noise. When I came in sight of the car, I was crawling awhile and then getting to my feet and staggering along until I stumbled over a stone.

It is hard for anyone who has never been through this to understand how the lack of water for a few hours can weaken a person, and a great many of the people who have had the experience never came back to tell of it. However, I finally reached the car and pulled myself upright, and clutched the thermos jug and swallowed some water. Right then I must have passed out, for the next thing I remember was waking up to find myself lying on the sand with the jug lying beside me, half empty. I must have gotten some water for I felt much better, but I was still thirsty and had to struggle to keep from drinking too much.

I finally recovered, and then discovered Doc, either asleep or unconscious in the rear of the car. I knew that a desert man would not lie asleep on the desert with that sun beating on his face if in his right mind, and concluded Doc must have lost control. When I aroused him he did not remember much about coming back to the car, except that he had felt very bad.

We returned to camp but neither of us ate much supper. I never told Doc what a time I had getting to the car. In fact, this is the first time I have ever told the full story. I didn't want my family to know that I had had such a narrow escape.

Right then I made up my mind to always CARRY MY OWN CANTEEN.

That night we managed to cool our water a little by hanging a canvas covered canteen up on the car, and pouring water over it. During the night the evaporation of the water from the canvas reduced the temperature a few degrees. That was the curious part of the trip. Here I had been so thirsty a few hours before that any kind of water would have been welcome, and there I was trying to cool it off! Oh well, I guess that was the natural thing to do.

We spent another day at this camp and collected a car-load of specimens and gem materials. We found some very nice geodes with quartz crystals. This last day we returned to the canyon that we were in the day before, and recovered the tools and the bag of Californite. I afterward cut some gems for a silver bracelet, ring and necklace for my wife from this material.

Early next morning we returned to the river, and on the way, we stopped at the jasper deposit and collected a large amount of fragments of jasper of every color. Crossing the river we returned to Mannix, and about a half mile west of the service station we turned north across the desert for about three miles to Mule Canyon. Here there is a mountain of jasper but it is not as delicately colored as the jasper we found south of the river. There is a mineral water spring here. The water does not taste good, but would be far better than none. There is an old abandoned dugout there, partly built of wood but mostly dug into the hillside. It was used as a stage station at the time when stages were the only means of transportation between California and the east, by land. Near here we found the remains of an old Indian camp. Doc told me there was an Indian cemetery near there. The hill directly behind the dugout produced many agates and some good geodes.

Leaving here we traveled north over a dry lake bed almost five miles. Just before this trail joined a dirt road running west, we came upon an artesian well on the dry lake bed. There was a four-inch pipe sticking up out of the ground about six feet and extended out at right angles with the end turned down-

ward. From this pipe a stream of pure, cold water pours all the year around. It was drilled and the pipe put in by a man who tried to farm the land, but for some reason gave it up. When the water falls to the ground it disappears into the sand before flowing fifty feet. There is a small amount of vegetation around it, but not as much as one would expect.

We refilled our cans, our radiator, and ourselves, and not satisfied with this we disrobed and had a shower-bath.

Traveling west on the dirt road we passed a number of small ranches, and at each of these there was a flowing well similar to the one we had just left. These ranches seemed to have good crops.

Continuing west we passed north of Barstow to the Hinkley road, and went from there to an old turquoise mine. I cannot give the location of this mine, as it is private property, and not open to the public. The turquois is mostly green, but some of it is very nice and I have some good gems from it. We reached Victorville in time for a late supper and were glad to visit a restaurant as we were tired of our own cooking.

We decided to continue on to Los Angeles, which meant a hundred and twenty miles more, mostly down grade. The trip from here home was uneventful, except that near Alhambra, as we were feeling our way along through a dense fog, two hold-up men undertook to rob us. I heard a noise and looked back in time to see a man jump on the left running-board behind Doc. Before he got his balance I shoved him off and then I heard Doc laugh and looked around to find that he had his gun on a man on the right running-board behind me. When this chap saw the gun he remembered that he had a date elsewhere, and left us at once. This happened about 10:30 and we arrived home about midnight.

I had not seen a razor for more than a week and had lost my coat in which I carried my comb. My wife declared I looked worse than any tramp ever looked. I had ruined my shirt and trousers on the slide, and worn out my shoes, but just the same I was happy and had enjoyed the trip. In addition I had about two hundred pounds of good rocks. My wife said she was glad I came home at night when the neighbors could not see me.

Well, it is curious what a collector will go through to get the rocks and minerals which have become a part of his existence, if he is a true collector. I had a good time and secured plenty of good material—and that is all that matters to a collector.

COLORADO AMETHYST

Allan Caplan, Box 144, Boulder, Colorado

The occurrence of amethyst quartz as a gangue mineral throughout the mining districts of Colorado is limited to a few localities. Fine cutting material is rather unusual; not one locality has produced material of quality suitable for cutting, although occasional specimens of gem quality have been secured. The crystallized geodes containing amethyst crystals, which are typical of the South American areas, are not acquired in Colorado.

Without any doubt, the best locality for amethyst is the famous silver district of Creede which is located in the southwestern part of the state. The original name of the town was Amethyst; later it was changed to Creede in honor of the prospector who discovered the rich silver veins. The gangue mineral of the veins is almost entirely quartz, a considerable amount of which is amethyst. In most cases, the quartz is banded in various shades of blues and greens with a thick mass of fine-colored amethyst above the bands. Vugs within the vein are composed of amethyst crystals which are generally pale in color; however, deep-colored crystals are sometimes obtained. Galena, sphalerite, and chalcopyrite are commonly found with deep-colored amethyst — such specimens are very beautiful. When the mines were operating in the high-grade ore, bright masses of native silver were found with amethyst. As a general rule, however, the amethyst quartz does not contain sufficient silver to make the ore worth shipping; and the material is thrown over the dump. For this reason, the mine dumps at Creede have held the interests of collectors and tourists since the discovery of the camp.

Other localities throughout the state are of small importance. A number of mines having a small amount of amethyst gangue, sometimes strike vugs of crystals, but the color is rarely gemmy. The mines at Cripple Creek, Red Mountain (Tennessee Tunnel) have such findings. Near Fort Collins, large, dark purple crystals are found in a mud, but the quality is poor.

The most striking and noteworthy feature of Colorado amethyst is the polished masses of banded material from Creede. Fantastic but beautiful designs are revealed when pieces are cut and polished; more so when the pieces are cut to translucent slabs. Amethyst of this nature has not been excelled from any locality in the country.

COLLECTING AROUND CHESTER, VT.

By JOHN PIERCE

Middlebury College, Middlebury, Vt.

Certain sections of Vermont, notably the Southeast, offer a rich field to the Mineral-collector variety of human. The region around Chester and Springfield has attracted many seekers, and the Vermont Mineralogical Society was founded in Springfield. However, the members of this body travel far afield, sometimes into New Hampshire or Massachusetts so I will confine my few words to the possibilities for visitors, and in passing leave tribute for their their good work.

Southeastern Vermont is mainly a metamorphic region after both sedimentary and igneous rock, and as part of the New England Upland is poor in metallic minerals, of ore quality but has much to interest the collector. Let's start over at Chester. There, metamorphism of igneous pyroxenites and periodtites to talc, steatite, serpentine and (pro)chlorite has left crystals beautifully formed, of magnetite, pyrite, actinolite, and ferromagnesian minerals. Magnetites up to three-quarters of an inch in diameter, perfect octahedrons, are chipped from the same rock as great perfect cubes of pyrite up to an inch and a quarter. Beside me as I write I have a penetrating occurrence of the two together in prochlorite matrix. These came from the dump at the Gould quarry just Northwest of Chester. The Holden quarry offers soapstone composed of radiating fibers, and from the quarry of the American Soapstone Finish Co. comes delicately foliated talc. Serpentine forms the North wall, and lens-shaped masses of actinolite crystals are thrown out on the dump. These crystals are brown to black, about a quarter of an inch wide and indefinitely long, although I never saw one more than six inches long. They form in bundles displacing the talc matrix. You see, one can have an interesting couple of days around the talc quarries alone.

Chester also contains a formation of schist which will give your hammer-arm a workout. In one quarry, not at present running, beside the road from Gassetts to Ludlow, are found garnets, kyanite, actinolite, and tourmaline in a mtrix of muscovite-sericite. The quarry was opened for the garnets as abrasive and the mica for roofing. The garnets here are mostly perfectly-formed dodecahedrons up to an inch in diameter, almandite variety, although smaller ones are more common. Some of them exhibit twinning, too, of several degrees. Small crystals of Kyanite, with the blue line up the middle, and the hardness of 4 lengthwise and about 6 across. are encountered in this rock. A specimen of this is a beautiful thing, with the sparkling sericite broken up by garnets and other crystals. Small untwinned staurolites commonly fleck the rock throughout, and if one wishes an adventure, let him make a thin-section analysis of the schist under a polarizing microscope. The writer would appreciate a complete enumeration of the minerals found this way.

Before the great gold strikes were made in the west, our eastern crystalline massives furnished most of the country's gold. While most of this came from the southern Piedmont, it is found in Southeastern Vermont in just under paying quantities. In Plymouth, not far from Cal Collidge's birthplace and grave, pannings from Reading Brook were sufficient to start a wild-cat mine in a barren quartz vein above the brook. Legend has it that there were murders, intrigues and all the dramatic paraphernalia concerning crooked mining there. Stock was sold on the basis of clever salting and a real

bar of gold that was taken to the train at Ludlow every Saturday night with much ceremony, and back-tracked the same night to go again the next week. All the while, independent panners in the brook made about $2.50 a day until the placers were exhausted, upon which the whole mine folded up. The shaft is still there, and offers a bit of exploration to somebody armed with courage and a long rope. And a few grains of gold may still be panned from flood-exposed riffles near the brook. The gold, of course, is of glacial origin, the lode probably being somewhere in Canada. Other places near there offer a little gold, too. The Springfield bunch spent some interesting days up a brook near Gassetts, and learned to pan, if they they didn't strike it rich. And nobody caught cold from standing in the brook. either, although some of them would have preferred fishing. The "color" was just enough to show their friends the largest "nugget" being only a little better than an eighth of an inch.

So far, I have stuck pretty much to Chester. While this is probably the most mineralogically interesting single locality, the great twinned staurolites of Claremont, the hornblende of Springfield and the feldspar of our neighboring Acworth, New Hampshire, mustn't be forgotten. "Beryl Hill" in Acworth has given us several interesting days and many fine specimens of beryl and 'spar. And if you're visiting Vermont, and are interested in the section described, one of the Society can tell you all you wish to know. An inquiry at the public library there, where an interesting exhibit is kept, will contact one of the members.

Concerning the rest of Vermont, mineral wealth has made the State famous. Slate, Granite and Marble are quarried for their exceptionally fine quality. A visit to the West Rutland quarry is fascinating, and the exhibit at Proctor of all types of marble, quarried all over the State and finished there, is an adventure in the beauty of stone as it is cut, carved and polished. The new Supreme Court building in Washington was made of Vermont marble finished at Proctor. The same kind of a visit to the Barre Granite quarries and plants will show you much you never realized before, too.

If the collector is interested in fossils—the Champlain Valley offers the **most complete** variety of Ordovician and Cambrian fossils to be found. These often turn up in polished slabs of marble, too—Orthoceras, Brachiopods, Crinoids. Middlebury College has a most complete collections of these, assembled b-- Professors Brainerd and Seelye. So typical is the Champlain Valley of Ordovicians that at one time the Ordovician Period was proposed to be called "Champlainian."

A PROPOSED LISTING OF COLLECTORS AND LOCALITIES

By CAPT. H. E. MITCHELL

About forty years ago, when I was a cadet at West Point, I became enthused with the many historical places and objects there. I was impressed with the dearth of information available (without research) to cadets and to visitors. People would visit the Academy and, all unknowingly, pass points of interest, which they really wanted to see. I compiled an historical guidebook. The Superintendent not only approved it but had it printed on the Academy Press. It was issued free. When I graduated, I gave permission to the civilian foreman printer to use the data. He had a new edition printed elsewhere and sold the book. Since then, the guidebook has been improved and issued. Thousands of visitors and cadets have been better able to enjoy that historical place by having the guidebook which is also a nice souvenir. Mineral collectors similarly pass interesting deposits through lack of information.

As mineral-minded people travel in strange parts of our country, they would often appreciate having the names and addresses of other collectors and the locations of mineral deposits along their route of travel. Collectors would often be saved much time and money (through avaiding "wild goose chases") if they had more up-to-date information about places of which they have read but that are no longer worth-while locations for getting specimens. I seek to aid in getting this information. I plan to list the names and addresses of those mineral collectors who desire to have visiting mineral-minded people call at their homes. Each such name will be given a number which will be marked on the auto-route map of his state. Then, if touring collectors will stop at my store, I will give them such names with addresses and other pertinent data free of any charge or obligation. The information file will not be open to inspection. I will give such information as I think proper. Effort will be made to confine use of names to the one purpose intended. If at any time a person wishes calls on him to cease, if he so writes to me, his card will be withdrawn from the file. For those who cannot come to the store, I am willing to give my time free but must charge a reasonable sum for clerical aid, postage and stationery. If you care to cooperate in this plan please send me the data requested below. It will take some time to tabulate the reports. Prompt replies to this appeal will expedite the work. Notice will be given when information will be furnished.

QUESTIONNAIRE

Number your replies to correspond with the questions and requests.

1. Print (or type) your name and complete address.
2. Give business address if you desire.
3. State the time (day and time of day) you prefer visitors to call.
4. State briefly but explicitly the easiest route to follow from some prominent place in your city, preferably on a marked highway, to your home.
5. Do you desire any collectors to visit you?
6. If not, state the sort that you do want. (Educators, collectors of fossils, petrified wood, semi-precious stones, polished rocks, economic minerals, crystals, micromounts, fluorescent minerals or general minerals.)
7. What do you collect? Read No. 6 for suggestions.
8. In what do you especially concentrate your efforts?
9. Do you have a cutting and polishing outfit?
10. Will you be able to direct visitors to mineral localities near your city?
11. What minerals should they find?
12. Do you sell or exchange minerals or both?
13. Add other pertinent information, then sign your name.

On the back of your letter or on another sheet please describe how to reach one mineral locality. This information when given to tourists will enable them to visit the place enrouje to your city or in case they miss seeing you. Select a place really worth visiting. State what minerals will possibly be found there. Describe the route in words giving such aids as the mileage between turns in the road, prominent identifying features and where to get further information if it should be necessary. Mention such things as high-center roads, very steep grades, deep sand, and so forth. Mention any dangerous places enroute to or at the deposit. Then draw a sketch. First of all, mark which way is north. Include some prominent highway with a definite point on it. Continue your sketch from this point. Mark paved highways, "P", hard-surfaced roads, "H", dirt roads, "D", and sandy, desert roads, "S". Do not list places that you know are closed to collectors by the owners. (The basic idea is to save the visitors needless, disappointing trips.)

Mail this data as promptly as convenient to me at my new address, 637 Redondo Avenue, Long Beach, California.

A BIG EXHIBIT

The second phase of the celebration of the New York Mineralogical Club's 50th Anniversary will be an exhibition by the club members in the Maxwell Hall of the American Museum of Natural History, New York, N. Y., on Saturday afternoon and evening, March 13th. Club members, allied clubs and others will be invited to exhibit specimens, equipment and new discoveries to serve as a stimulus to the popular interest in mineralogy and to show visitors what they themselves might accomplish, should they be so inclined. All those interested are invited to attend.

The Editor of **Rocks and Minerals Magazine** will have an exhibit and he would be delighted to greet any friends who may care to call on him.

THE PROSPECTOR

I started out to strike it rich,
"Them hills," so I was told,
"Were full of ores and gems and sich,
And tons of yellow gold."
I felt as sure as I could feel
That luck was with me strong.
I wanted wealth in one big deal,
Then women, wine, and song.

I dug in Klondike's golden soil
With scurvy sourdoughs,
But all I got for all my toil
Was ten hard frozen toes.
I picked and blasted Congo's mud
In search of diamond gleam.
High flood of hope surged in my blood
Then vanished like a dream.

I dove for pearls in limpid seas,
I panned for rubies red.
With aching back and sagging knees
I tunneled hills for lead.
I tramped through stinking jungle mire
In search of em'ralds green.
I scoured the Bush for opal fire.
I mined for copper's sheen.

Dame Fortune sometimes smiled on me,
Sometimes she wore a frown.
At times I found prosperity,
Sometimes the Booby's crown.
I never gained the wealth I sought,
But gained far more than gold.
I learned the lessons Nature taught
Through hunger, want, and cold.

I learned to read the mighty earth,
Its pleasure and its pain.
I learned a gorgeous sunset's worth,
The loving touch of rain.
I learned to see within the rock
And sense a mighty plan.
I found the key that would unlock
God's treasure house, for man.

HOWARD R. WILLIAMS,
Western Reserve Academy,
Hudson, Ohio.

MICRO-METHOD FOR DETERMINING THE STREAK OF MINERALS

EUGENE W. BLANK, Colgate-Palmolive-Peet Co.
Jersey City, N. J.

The streak left by a mineral on an unglazed, porcelain surface is a valuable aid in its identification. In many cases it is impossible to apply the streak test because the mineral is either too small, or, as often in the case of crystals, precluded by the resulting disfigurement of the specimen. The latter difficulties can be mitigated by use of the following method of procedure.

Break a thin, unglazed porcelain plate into small pieces about ¼-inch long by ⅛-inch wide. The pieces do not need to be exactly of the size but should not be larger. It is essential that they be broad at one end and have a sharp angle or point at the other.

File back the points of an old ruling pen, such as is used for drafting purposes, until the thick portion of the metal is reached. Finally roughen the inside of the pen blades. Insert one of the small pieces of porcelain, prepared as described above, between the filed blades of the pen and tighten the thumbscrew on the pen until the porcelain is firmly held in position.

Make a short (1/50-inch) scratch on the specimen with one of the sharp edges or the point of the porcelain piece in as inconspicuous a position as possible and examine the porcelain point under a strong lens in a good light or under the low power of a microscope by a reflected light. Examine the porcelain carefully to determine the color of the streak and its characteristics.

If desired, instead of making a scratch on the specimen, the porcelain point can be held against an inconspicuous surface of the specimen and rotated once while pressing lightly on the holder.

By fastening the porcelain in the pen it is possible to exert considerable pressure when obtaining the streak of a hard mineral besides providing a convenient handle by which to manipulate and examine the porcelain. Also, crystals that are situated in difficult places to reach, such as cavities or intergrown with other crystals, can be readily tested.

It is planned to extend this method, if possible, in the future, to include the hardness determination.

A UNIQUE QUARTZ SPECIMEN

By PETER ZODAC, Editor
Rocks and Minerals

The writer has in his collection a quartz specimen that is unique. It came from the hematite mines of Soudan, Minn. The specimen consists of three rock crystals, attached to each other in parallel position, one slightly over the other.

The top crystal is 1¼ inches long and ½ inch in diameter.
The center crystal is ¾ inch long and ⅜ inch in diameter. Both crystals have but one termination each.
The bottom crystal is 2½ inches long, 1 inch in diameter and is doubly terminated.

The specimen was attached to a side wall in the mine by means of the two upper crystals (hence only one termination for each); the largest and doubly terminated crystal, hung down below.

While the crystals were attached to the side wall of the mine, four distinct solutions containing mineral matter dripped down and over them. The first time the solution deposited iron, which settled over the exposed surfaces (on the top of each crystal) and deposite hematitie, as a rusty reddish crust. Next a solution carrying iron and sulphur dripped over the crystals and deposited pyrite as a thin drusy brassy-yellow crust on top of the hematite. Then a solution carrying calcium and magnesium and perhaps a little iron dripped over the crystals and deposited dolomite as a thin brownish drusy crust on top of the pyrite. (Pure dolomite is white, iron makes it brown). And finally iron was again deposited, but only slightly just enough to stain part of the dolomite a reddish tint.

It is evident that between each deposition there was a period when no solution dripped over the crystals, so each mineral had an opportunity to crystallize out. The dolomite crust is the thickest; next is the pyrite.

That the largest crystal was the one to hang lowest in the mine is evidenced in two ways. First, it is doubly terminated and had been and still is attached only to the center crystal; the other crystals each have a correspondingly termination broken where they had been attached to the wall. Second, only half the surface of each crystal is coated with crusts; the other halves being underneath and had been protected.

The various crusts are distinctly seen in the specimen.

BIBLIOGRAPHICAL NOTES

***The Diamond (Queen of Gems)*: By W. Scott Lewis, 2500 N. Beachwood Dr., Hollywood, Calif. A 17-page mimeographed booklet packed with so much useful information on the precious gem that we are pleased to recommend it to our readers. By all means send for a copy while the supply lasts. Price 15c and obtainable from the author.**

***The Mineral World*: By W. Scott Lewis, 2500 N. Beachwood Dr., Hollywood, Calif. Another 17-page mimeographed booklet by the popular author. The booklet deals chiefly with the three great classes of rocks, igneous, sedimentary, and metamorphic. Price 15c.**

***Directory of American Mineral and Gem Collectors and Collections*: Compiled and published by Wm. C. McKinley, 730-B 4th Ave., Peoria, Ill., 26 pages, 10c.**

***The Heavier Metals and Minerals in the Witwatersrand Banket*: By Peter Macadam. A paper covering investigations made to ascertain whether any relation exists between proportions of heavy minerals in Witwatersrand Bankets and their corresponding gold content. (From Transactions of the Geological Society of South Africa, Vol. XXXIX, 1936, pp. 77-79.)**

THE AMATEUR LAPIDARY

Conducted by J. H. HOWARD*
504 Crescent Ave., Greeneville, S. C.

Amateur and professional lapidaries are cordially invited to submit contributions and so make this department of interest to all.

*Author of—*The Working of Semi-Precious Stones*, and *Handbook for the Amateur Lapidary*.

SYNTHETIC GEMS: THE MINERAL MARTYRS

By R. EMMET DOHERTY, Pres.
Rocks and Minerals Association

Little but contempt has been shown for the synthetically produced gem stone because it was made in the laboratory and not in the earth.

The marvelous discovery made by the French chemist, A. Verneuil, in 1902, brought into the world a process by which the growth of the gem crystal, as well as the color, could be controlled by means of an inverted oxyhydrogen blowpipe. For the corundum group, fine particles of powdered alumina are passed through the flame at a temperature of 2000 degrees Centigrade, then being fused slowly, build up a pear-shaped mass of perfectly clear gem material, called a boule. Boules up to 250 carats each have been made, possessing the same reticular crystallization of triangles, the same hardness, the same refractive index, and other physical characteristics as possessed by the natural corundums, but; far superior in uniformity, lacking the flaws, inclusions, and "silk" found in the nature-made product. Why then, should not these man-made gems be prized as highly as nature's own? The chemical composition is precisely the same and the process is a duplicate of nature's own, but because man had the ingenuity to rush the action, he produces 12 carats an hour in each blowpipe, totaling many tons a year, where nature spent thousands of years at the same task. Is this any reason why synthetic gems should be scoffed at?

The lapidary uses carborundum with little compunction about its synthetic origin. Gold is mined in finely decimated particles and processed into solid objects which is not natural, yet we do not hear anyone deriding its value because it is synthetic. Fur bearing animals are raised in captivity at a faster rate than they would propagate if left wild. The care which they receive in captivity is one example where a controlled product brings higher prices because of its perfection.

Had Verneuil kept his discovery a secret, no doubt tremendously high prices would be demanded for gem material of this mode of origin, but because of his unselfishness in making known his discovery, the product of his brainchild has aspersions cast upon it, and is held in ill-repute by those seeking profit from the inferior natural gem.

Nearly all known minerals have been duplicated in laboratories in a sizeable or a minute degree, but often at a greater cost than the natural mineral. Some of the loveliest shades and colors are to be found in the synthetic corundums; yellow, blue, pink and ruby, in fact, almost the entire spectrum is displayed in these clear flawless gems.

Imagine the consternation among the diamond merchants, stockholders and syndicates if some clever mineralogist or chemist finally succeeds in making synthetic diamonds on a commercial scale.

Will the world look at these stones askance if they can be sold at reasonable prices? If the hardness and brilliance is identical, will the origin be questioned? Will industry turn them down because they are synthetic? I think not.

A PEEK AT OUR MAIL

Marvellous, Says He!

Aberdeen, Wash.—The articles in the last few issues and the general set-up of ROCKS AND MINERALS were marvellous.—Clair A. Scott.

We Need More Publicity!

Cleveland, Ohio—To say the very least, I was much elated to receive my first numbers of ROCKS AND MINERALS. I also gave myself many pats on the back for having taken the steps necessary to join the Association. My only regret is that I did not join sooner—you should give yourselves more publicity.—G. C. Whitney.

You Should See the Agate Number!

Holyoke, Mass.—May I offer my compliments on ROCKS AND MINERALS? Although I've seen only one number, I find it much better than was expected.—Warren P. Cleveland.

Did You Ever Hear a Girl—Howling! Well Bob Did!

Nyack, N. Y.—Find enclosed $1.50 as payment for a year's subscription to ROCKS AND MINERALS in favor of Miss Priscilla Taylor of ———. I told her what an interesting magazine it was and how its arrival each month was as satisfying as an after-dinner smoke, and that I got as excited over reading it as I do in a police court. She has never seen a copy of R & M but it will soon be her right to howl. I hope that when she sees the magazine it may bowl her over.—Bob Doig (a rock fiend).

Interests the Whole Family!

Crestwood, N. Y.—We are anxiously waiting for fine weather in order to make some more trips as the whole family have become mineral-minded thanks to your fine magazine, ROCKS AND MINERALS.—Evelyn Waite.

He's Safe With Us!

Salt Lake City, Utah—Enclosed find $1.50 as membership in the Rocks and Minerals Association for C. E. Fisher of Midvale, Utah. I now turn him over to your care and protection knowing him to be placed in the best company in the land.—C. J. Rordell.

Nuff Said!

New York, N. Y.—'Nother year of R & M please. It's getting better'n better. Congratulations.—A. F. Mainland.

Gosh, A New Rock Hound!

Lawndale, Calif.—Find enclosed $1.50 as payment for a subscription for a new Rock Hound whom I just discovered. He also wants to become a member of good standing in our fraternity, so send him a membership card.—H. F. Frodell.

More Will Follow!

Milwaukee, Wisc.—The last four issues of ROCKS AND MINERALS have been the best for both looks and contents of all those I have received in the years that I have been a subscriber and reader.—Kern C. Jackson.

Leads Them All!

Hudson, N. Y.—You will find my check enclosed for 1937 subscription to the "best magazine in the country"—ROCKS AND MINERALS.—Andy Dargis.

O. K. With Us!

Simla, Colo.—Let's have more articles of actual finds and treks by "Rockhounds" as in the December issue.—Burt Steward.

Thank You, Lady!

St. John, Kans.—I like ROCKS AND MINERALS so much that I can't do without it. I enjoyed the December number more than any other with the exception of the Special Agate Number, as articles on mineral trips appeal to me.—Mrs. L. Miller.

We Will, Albert!

Hayti, Mo.—Enclosed is my renewal. I certainly do not want to miss a single issue. I was especially well pleased with the articles in the December issue. May we have more articles on mineral trips. An enthusiastic subscriber.—Albert Kidwell.

Is Well Pleased!

Ellensburg, Wash.—I enjoyed the 10th Anniversary Number immensely as it contained a wealth of information of interest to mineral lovers. I find it invaluable for reference also. Furthermore, I want to tell you how much I enjoyed the accounts of the various field trips in the December issue. May we have many more such articles.—C. N. Clinesmith.

Enjoys Trip Articles!

San Francisco, Calif.—May I here express my enjoyment of the articles on trips to mineral localities in the December issue? I would enjoy articles of this nature every month.—J. Harold Soper.

Gyp Dealers Beware!

Alhambra, Calif.—Mr. Harstad's article "Agates and Such" was splendidly written, extremely informative, and loaded with good advice and a word of caution to "Gyp" dealers. I feel confident that it will serve our hobby greatly.—C. D. Puddy.

Hello—Gilbert Hart!

Sunnyvale, Calif.—I miss my good friend's articles (Gilbert Hart). Why can't he be persuaded to write an article now and then? His list of Gem Names was alone worth the price of the subscriptions.—William B. Pitts.

CHIPS FROM THE QUARRY

(Formerly the Bulletin Board)

ANOTHER RARE FIND IN OREGON

Rocks and Minerals has been very fortunate in being able to present to its readers the finding of some very important and unusual minerals in the State of Oregon. Oregon is on the Pacific Ocean, New York on the Atlantic, with a continent between them. We owe this however to some very much appreciated friends of Rocks and Minerals who themselves made the discoveries. These have been P. L. Forbes, who discovered iridescent Obsidian; J. R. Wharton (large masses of petrified "teredo" wood near Roseburg—March, 1936); E. A. Southwick (A Drusy Agate Find)—Dec., 1936.

In this issue we have a heretofor unknown occurrence of iridescence in pumice, a discovery made by Mr. C. P. Becker and reported to us by Mr. M. Van Landuyt, both of Bend. Oregon. Mr. Van Landuyt has sent us some very beautiful specimens of the iridescence.

Mr. Becker's article, descriptive of the locality, the nature of the volcanic deposit in which pumice is found and the somewhat rare occurrence of the iridescence displayed when nodules or bombs are broken open, appears in this issue of Rocks and Minerals and will undoubtedly be read with much interest by our subscribers.

Dr. Herbert P. Whitlock, curator of minerals and gems of the American Museum of Natural History, Central Park at 79th Street, New York City, will give four informal talks on "The Appreciation of Gems." Each talk, illustrated by lantern slides, will be given on a Saturday afternoon at 4:00 p. m. as follows: April 3, "What is a Gem?"; April 10, "Diamonds: From Mine to Market"; April 17, Famous Diamonds of the World"; April 24, "The Art of the Lapidary." The talks will be given at the Museum and are open to the public.

THE ORIGIN OF THE OPAL

Faster and faster fall the drops of rain from the sky. But through the wall of water shine the flickering rays of the sun peeping into the dark forest. Just as suddenly as it had come the rain disappears and Lightning-foot, an Indian maiden, runs out of the tent with her sisters. In the midst of her frolicsome play, she gives a cry of ecstasy because she sees in the sky a beautiful rainbow. She has always prayed for one of these treasures; now realizing that the Great Spirit helps those who themselves make an effort, she leaps to her feet and is away like a flash toward the top of the hill where the span of color touches the earth.

Feeling the wind whistling in her hair she races so quickly that she can hardly discern the beautiful violets, wild roses, and mountain laurel. Her arms thrust expectantly before her and her eyes aglow with excitement, she reaches the top where she last saw the multi-colored arch. But alas. The rainbow is not there but on the hill beyond. Lightning-foot's little chin quivers; her arms fall limply to her sides in disappointment. Suddenly her back straightens and determination glows in her eyes. Down the glade and up the next hill she renews the chase. The sun shines out brighter than ever and the raindrops begin to melt away. At last she reaches the summit. She searches all over for her treasure but sees it nowhere. Poor Lightning-foot! She is so discouraged she sinks down on a log and great tears fill her eyes, welling up from her broken heart, shutting out the sunlight. But even as she weeps, her mind is speaking to her heart saying, "Lightning-foot, tears are futile; crying will give you nothing; cheer up!" Mistily in the rays of the sun she sees at her feet a large tear — but no — something brighter, more colorful, even as the beautiful rainbow. Gently she picks it up, the fragile jewel which she preserves as the first opal.

MARGARET CLARKE,
14 years old.